Docket No.: 2002P87049WOUS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Fufang Zha et al.
Serial No:	10/774,041
Confirmation No:	4995
Filed:	February 6, 2004
For:	METHOD OF CLEANING MEMBRANE MODULES
Examiner:	Krishnan S. Menon
Art Unit:	1723

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8(a)

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Commissioner for Patents
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APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Dear Sir:

This Appeal Brief is filed in response to the Advisory Action mailed on January 23, 2007 and in furtherance of the Notice of Appeal filed on January 3, 2007. A fee of $500 under 37 C.F.R. § 41.20(a)(2) accompanies this filing. Also accompanying this filing is a Request and fee for a one-month extension of time.

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I. REAL PARTY IN INTEREST (37 C.F.R. § 41.37(c)(1)(i))

The real party in interest is the assignee of the instant application, namely Siemens Water Technologies Corp., a Delaware corporation with a place of business at 181 Thorn Hill Road, Warrendale, Pennsylvania 15086.

II. RELATED APPEALS AND INTERFERENCES (37 C.F.R. § 41.37(c)(1)(ii))

There are no appeals or interferences known to Appellant, Appellant's legal representative, or the assignee of the instant application that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS (37 C.F.R. § 41.37(c)(1)(iii))

Claims 1-24 were pending in the application as filed on February 6, 2004. In an Amendment filed on July 17, 2006, claims 1, 2, 5-8, 10, 11 and 13 were amended, claims 14-24 were canceled without prejudice or disclaimer, and new claim 25 was added. Claims 1-13 and 25 stand rejected, with claim 1 being in independent form. Claims 1-13 and 25 are being appealed herein.

IV. STATUS OF AMENDMENTS (37 C.F.R. § 41.37(c)(1)(iv))

No claim amendments were presented in a Response after Final filed on January 3, 2007. A copy of the claims as pending, incorporating any prior amendments and showing the status of each of the claims, is attached as a Claims Appendix beginning on page 6 of this Appeal Brief.

V. SUMMARY OF CLAIMED SUBJECT MATTER (37 C.F.R. § 41.37(c)(1)(v))

Aspects and examples of the claimed subject matter are generally directed to methods for cleaning membrane modules. In one example, a method for cleaning a membrane filtration module is disclosed. The module comprises at least one membrane located in a feed-containing vessel, the membrane comprising a permeable wall. The method generally involves steps of conducting a filtration operation wherein a feed is applied to a first side of the permeable wall and a filtrate is withdrawn from a second side of the permeable wall, suspending the filtration operation, and performing a cleaning process on the permeable wall to dislodge a contaminant therefrom into a liquid surrounding the membrane. The method further involves steps of forming a gas-containing region on the first side of the permeable wall; sealing the feed-

containing vessel, pressurizing a gas within the gas-containing region, and opening the feed-containing vessel to atmosphere. The gas-containing region expands and produces a sweep of the feed-containing vessel to remove the liquid containing the dislodged contaminant. (See [0031] to [0036] of corresponding U.S. Patent Application Publication No. US2004/0217053.)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL (37 C.F.R. § 41.37(c)(1)(vi))

Whether each of claims 1-13 and 25 is unpatentable over either Sunaoka et al. (hereinafter "Sunaoka") (U.S. 5,209,852) or Beck et al. (hereinafeter "Beck") (U.S. 6,159,373) where no proper *prima facie* case of obviousness has been established.

VII. ARGUMENT (37 C.F.R. § 41.37(c)(1)(vii))

For the reasons provided below, the Examiner's rejections are improper and should be reversed. Each of claims 1-13 and 25, as presented, is allowable.

A. Claims 1-13 and 25 are patentable over Sunaoka

Claims 1-13 and 25 were rejected under 35 U.S.C. § 102(b) as being anticipated by, or, in the alternative, under 35 U.S.C. § 103(a), as being obvious over Sunaoka.

Sunaoka fails to disclose, teach or suggest a method for cleaning a membrane filtration module as recited in independent claim 1. Claim 1 recites, in part, steps of forming a gas-containing region on the first side of the permeable wall, sealing the feed-containing vessel, pressurizing a gas within the gas-containing region, and opening the feed-containing vessel to atmosphere, whereby the gas-containing region expands and produces a sweep of the feed-containing vessel to remove the liquid containing the dislodged contaminant.

Sunaoka discloses a two-stage process for membrane cleaning aimed at preventing outer surface roughening of the membranes. (See Sunaoka at col. 5, lines 27-31). A preliminary drain down with valve 21 opened to drain, facilitated by a water head or compressed air, may be carried out to discharge solids before second-stage scrubbing, or, alternatively, this draining may be effected simultaneously with the first-stage scrubbing or in the early course of the second-stage scrubbing. (See Sunaoka at col. 8, line 45 through col. 9, line 6; col. 10, lines 3-17). Sunaoka discloses that the drain rate can be adjusted with valve 21 and that it is "preferably

adjusted such that the waste water in the lower compartment R is drained therefrom in a relatively short time." (See Sunaoka at col. 10, lines 28-35). Sunaoka fails, however, to disclose or suggest alternative methods for effecting a high velocity drain down to remove accumulated solids. More specifically, Sunaoka does not teach or suggest a method involving sealing the feed-containing vessel and pressurizing a gas within a gas-containing region as presently recited.

Sunaoka clearly states that valve 21 is opened to enable drainage, and that the draining step may make use of a water head or compressed air to effect quick draining of waste water. Sunaoka makes no inference or teaching that valve 21 is initially closed when compressed air is used to enhance drain down. Nor is there any inherent requirement for valve 21 to be closed if compressed air is used. To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. (See *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999); MPEP at Section 2112).

No such evidence has been presented to establish inherency. As disclosed by Sunaoka, the pressure of the compressed air simply facilitates the purging of waste water via open valve 21. In fact, it would have been counterintuitive to build pressure in a vessel housing delicate filtration membranes susceptible to damage, particularly considering Sunaoka's concerns with regard to membrane surface roughening by dispersed coarse particles. (See Sunaoka at col. 5, ll. 27-31). The present invention clearly differs from Sunaoka by developing a compressed air region with the tank sealed prior to drain down, generating both a blowout effect on the membrane pores and a high velocity sweep of the vessel for improved cleaning efficiency.

Because Sunaoka does not disclose, teach or suggest sealing the feed-containing vessel and pressurizing a gas within a gas-containing region, independent claim 1 is patentable over the teaching of Sunaoka. Claims 2-13 and 25 depend from claim 1 and are likewise patentable over the teaching of Sunaoka for at least the same reasons.

B. Claims 1-4, 9-13 and 25 are patentable over Beck

Claims 1-4, 9-13 and 25 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,159,373 to Beck.

Beck discloses a method of removing retained species from a membrane module upon termination of a concentration cycle. Clarified liquid remaining in the membrane lumens is removed, and high pressure compressed gas is then introduced through inlet 18 and the lumens of the fibers 12. The still liquid-filled shell is sealed, and a reservoir of high pressure gas is accumulated in the fiber lumens because the liquid in the shell is relatively incompressible thus preventing gas from penetrating the porous walls. (See Beck at col. 5, lines 13-25). The shell outlet 17 is then opened, resulting in an explosive decompression of the pressurized gas through the fiber walls and causing dislodgment of foulants. (See Beck at col. 5, lines 26-31). Beck does not disclose, teach or suggest pressurizing a gas in a gas-containing region on the feed-side of the permeable wall as presently recited.

Beck creates a compressed gas containing region within the lumen rather than on the feed-side of the membrane wall. Because the feed side of the tank is full of incompressible liquid and the lumen of the membrane is pressurized with gas, gas will not move through the membrane pores until the feed side is opened. Unlike the Beck process, the present invention offers the benefit that the liquid need not be removed from the lumens during drain down, resulting in avoiding having to re-wet the membranes when recommencing filtration.

Because Beck does not disclose, teach or suggest pressurizing a gas in a gas-containing region on the feed-side of the permeable wall, independent claim 1 is patentable over the teaching of Beck. Claims 2-4, 9-13 and 25 depend from claim 1 and are likewise patentable for at least the same reasons.

C. Conclusion

In view of the above, the rejections over both Sunaoka and Beck are improper. Because no proper *prima facie* case of obviousness has been established, Appellant respectfully requests reversal of the rejections and allowance of the claims.

VIII. CLAIMS APPENDIX (37 C.F.R. § 41.37(c)(1)(viii))

1. (Previously Presented) A method for cleaning a membrane filtration module, the module comprising at least one membrane located in a feed-containing vessel, the membrane comprising a permeable wall, the method comprising:

conducting a filtration operation wherein a feed is applied to a first side of the permeable wall and a filtrate is withdrawn from a second side of the permeable wall;

suspending the filtration operation;

performing a cleaning process on the permeable wall to dislodge a contaminant therefrom into a liquid surrounding the membrane;

forming a gas-containing region on the first side of the permeable wall;

sealing the feed-containing vessel;

pressurizing a gas within the gas-containing region; and

opening the feed-containing vessel to atmosphere, whereby the gas-containing region expands and produces a sweep of the feed-containing vessel to remove the liquid containing the dislodged contaminant.

2. (Previously Presented) The method according to claim 1, wherein the step of performing a cleaning process comprises performing a fluid backwash of the permeable wall.

3. (Original) The method according to claim 2, wherein the fluid backwash comprises a liquid backwash.

4. (Original) The method according to claim 2, wherein the fluid backwash comprises a gas backwash.

5. (Previously Presented) The method according to claim 1, wherein a velocity of the sweep is greater than about 0.03 m/sec.

6. (Previously Presented) The method according to claim 1, wherein a velocity of the sweep is from about 0.3 m/sec to about 2.0 m/sec.

7. (Previously Presented) The method according to claim 1, wherein the step of performing a cleaning process comprises gas scrubbing a surface of the permeable wall.

8. (Previously Presented) The method according to claim 1, wherein the sweep of the feed-containing vessel is produced periodically in different directions within the vessel.

9. (Original) The method according to claim 1, wherein the membrane comprises a hollow fiber membrane, and wherein the filtrate is withdrawn from at least one end of the hollow fiber membrane during the filtration operation.

10. (Previously Presented) The method according to claim 1, wherein the gas-containing region is formed within the feed-containing vessel.

11. (Previously Presented) The method according to claim 1, wherein the gas-containing region is formed within a further vessel coupled to the feed-containing vessel; and wherein the step of sealing the feed-containing vessel comprises sealing the feed-containing vessel and the further vessel as a whole.

12. (Original) The method according to claim 10, wherein the gas-containing region is formed by partially draining down a feed liquid within the feed-containing vessel.

13. (Previously Presented) The method according to claim 10, wherein opening the feed-containing vessel comprises applying a fluid backwash to the membrane.

14-24. (Canceled)

25. (Previously Presented) The method according to claim 1, wherein the feed-containing vessel is opened to atmosphere when a pressure on the first side of the membrane approaches a pressure on the second side of the membrane to generate an instantaneous negative transmembrane pressure.

IX. EVIDENCE APPENDIX (37 C.F.R. § 41.37(c)(1)(ix))

None.

X. RELATED PROCEEDINGS APPENDIX (37 C.F.R. § 41.37(c)(1)(x))

None.

XI. CONCLUSION

For the reasons provided above, the rejections are improper and should be reversed. Appellant respectfully requests reversal of the rejections and issuance of a Notice of Allowance.

If there is any additional fee occasioned by this filing, including an extension fee that is not covered by an accompanying payment, please charge any deficiency to Deposit Account No. 50/2762, Ref. No. M2019-701920.

Respectfully submitted,
Fufang Zha et al., Applicant

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